and mortality. The chief drawback, however, is the resulting deformity, which can only be partially replaced by mechanical devices. Mortality in ordinary cases is no higher than in amputation of upper thigh. If on the other hand, there are large areas involved with tunneling sinuses, and great constitutional involvement, the operation is then one of last resort with an exceedingly high rate of mortality.

## INDICATIONS OF CESARIAN SECTION.*

By A. B. SPALDING, M. D., San Francisco.

The interest of the unborn child demands attention, and its life as well as its future health should be safeguarded by the conscientious attendant. To do this one must adopt a systematic method of examination of the pregnant woman and carry it out continuously. Too often this becomes a very monotonous procedure and the practitioner falls into the convenient habit of never troubling trouble until trouble troubles him. In this paper some conditions will be mentioned which occur fortunately rather infrequently, but when they do occur or exist tax the skill and the judgment of the attendant to the utmost. Conditions which demand interference to preserve fetal life without too much risk to the mother, and which are met successfully by the operation of Ceserian Section in opposition to therapeutic abortion, craniotomy, induction of premature labor, version and forceps.

Cesarian Section may be necessary to meet a sudden or unlooked for emergency of pregnancy or labor or it may be the last heroic effort to save a patient from misplaced confidence in the powers of nature, or from ill-judged efforts of the attendant to utilize forceps. The mortality of this emergency or late operation is high, certainly 50 per cent for both mother and child. The indications can not be briefly stated, as each case is an obstetrical entity in itself. One thing is clear and that is that the general surgeon performs this operation not infrequently for certain conditions which are best met by other obstetrical operations. For instance, following Lawson Tait, some surgeons have operated for placenta previa, amassing even in the reported cases a maternal mortality of over 20 per cent. It is interesting to note the reason Dr. Tait gave for his original operation. In his previous experience he had had fourteen cases of placenta previa and had lost seven of the mothers in attempting version. It is obvious that Dr. Tait was a surgeon and not an obstetrician. He was browsing in the wrong pasture.

Occasionally in placenta previa as well as some cases of eclampsia accidental hemorrhage, or sudden death of the mother during pregnancy Cesarian section is indicated, but as a general rule these conditions are best treated by other operative procedures. A case of maternal death during the last month of pregnancy from edema of the lungs complicating myocarditis, in which I performed a post mortem Cesarian section has led me to believe that to save the child one must operate while the mother is still alive. The literature also of the few reported cases seems to demonstrate that under such circumstances more babies survive when delivered through the natural passages. Other conditions of pregnancy such as cornual pregnancy, pregnancy with ovarian cyst and threatened rupture of the uterus from hysteropexy can be successfully treated at times only by Cesarian section.

The need for the emergency operation of Cesarian section during labor is usually indicative of a failure on the part of the attendant to carry out elementary principles of the practice of obstetrics. Either the patient has failed to call on her physician during pregnancy or the physician has committed the gross error of failure to properly inform himself in advance of the condition of his patient. Ascertaining these facts during labor not infrequently leads to infection, and Cesarian section in the face of infection carries with it a very high mortality.

When the operation of Cesarian section is anticipated and is the result of deliberate decision, the patient can be placed in a suitable institution and can be operated on at a time best calculated to conserve the life of mother and child. This selected operation is the ideal procedure and gives the best results. The fetal mortality should be small, and in the hands of a competent operator the maternal mortality should be less than 5 per cent.

There is an absolute indication for operation which is present whenever the disproportion between the passages and the child is so great that it is impossible to remove the fetus even after embryotomy. This is so when the true conjugate is less than five cm. or when the pelvis is blocked to an equal degree by any form of unyielding pathological growth. All other conditions which point to a probable inability on the part of nature to expel the contents of the uterus at term are included in the class of relative indications. Considerable diversity of opinion exists as to the practical value of relative indications, and Cesarian section is opposed by the supposed simpler operations of induction of premature labor, forceps, version, pubiotomy and symphyseotomy. Nature herself not infrequently demonstrates that all these procedures are necessary if the attendant will only give her time and opportunity to exert her power. The reason for this is that it is impossible to judge in advance the strength of the labor pains, the molding of the fetal head, the behavior of fibroid tumors or of cicatricial contractures of the vagina. The size of the fetal head can be only roughly estimated and the internal diameters of the contracted pelvis itself can be ascertained only with a fair degree of accuracy.

The antero-posterior diameter of the pelvic brim gives the most practical indications for the anticipation of Cesarian section. The old limit of seven and a half cm. has been gradually extended so that at present many operators consider eight and a half cm. or even nine cm. in a generally contracted pelvis as indicating the operation. It is a matter of indi-

*Read before the San Francisco County Medical Society, September, 1907.

vidual opinion as to the best way to manage these doubtful cases. Personally I believe the best results not only in regard to the life, but in regard to severe injuries to both mother and child, can be obtained by placing these patients in a properly equipped hospital, permitting them to demonstrate for a reasonable time the effect of labor pains, and when these fail to cause engagement of the presenting part to resort at once to Cesarian section, omitting all preliminary operative procedures which might tend to contuse or infect the uterus or its contents. It is needless to state that the approximate size and the correct diagnosis of position of the fetal head as well as the size and character of the maternal pelvis should be known in advance and that the fewest possible number of examinations should be made during labor.

Referring to the records of 685 confinements which have been under my care at the San Francisco Maternity, the maternity ward at the University of California Hospital and in private practice, I find that in addition to the emergency Cesarian section mentioned above five patients have presented during pregnancy indications for operation. As this series does not include consultation cases and as the above mentioned institutions are comparatively new and have not as yet attracted unusual cases from the profession these records should illustrate fairly well the frequency of the indications for Cesarian section. I desire to report and to analyze these cases, as they present many interesting facts for discussion.

Case 1. Relative indication. M. W. Single 1 Para. Age 18. Applied to the San Francisco Maternity Sept. 1st, 1905. When two years of age her left hip joint had been excised at the St. Luke's Hospital. She did not walk until one year later. For the past few years she had suffered with chronic bronchitis. She did not know the date of her last menstruation. Examination. Patient was five feet three inches tall, well nourished, walked with a marked limp. The physical examination of the chest was negative. The abdomen was enlarged to about the 32nd week. Child in L. O. A. position gave evidence of already being too large for the head to engage in the brim. The pelvic measurements were as follows: External, between spines 22 cm., crests 24.5 cm., left oblique 19.5 cm., right oblique 19 cm., external conjugate 17.5 cm., tuber ischii 8.3 cm. Internal, a marked flattening of the left side of the pelvis could be palpated, true conjugate 7.6 cm. The left extremity was 7.5 cm. shorter than the right. There was a profuse leucorrhea, which later was found to be free from pathogenic germs. Diagnosis, Coxalgic pelvis. The patient was given a simple cough mixture and requested to take cleansing douches. She continued well except for her cough and entered Lane Hospital December 9th, 1905. For four days the cervix was treated daily with 50 per cent solution of argyrol, and she was given daily bichloride douches. There was such evident disproportion between the brim of the pelvis and the fetal head that operation before the onset of labor pains was decided on. The usual median abdominal incision was made through the umbilicus as a mid point, and an eight-pound male infant delivered through an incision in the anterior wall of the uterus. The time of delivery was forty-five seconds, which is, I believe, a more rational procedure than the ten-second operation advocated by some operators. On account of suspected tuberculosis and at the request of the patient the fundal end of each tube was resected to prevent future conception. The patient developed a postoperative pneumonia, but recovered and left the hospital with her baby four weeks later. Subsequently tubercle bacilli were found in her sputum. The baby was well nourished. It was 52 cm. long at birth, and the biparietal diameter was 9 cm.

Case 2. Absolute indication. F. V. 1 Para. Age 29. Dwarf. Applied to the San Francisco Maternity January 25, 1906. Height four feet. Pelvic measurements: Inter spinous, 22.5 cm.; inter cristus, 23.5 cm.; left oblique, 19.5 cm.; right oblique, 19 cm.; external conjugate, 14.5 cm.; true conjugate, 4 cm. Diagnosis: Richitic flat, justo minor pelvis. Two weeks before term we lost track of this patient, but learned subsequently that she had been delivered by a local surgeon. Mother and baby survived the Cesarian section.

Case 3. Relative indication. Mrs. I. E. 1 Para. Age 25. Applied to the San Francisco Maternity August 15, 1906. English woman of the lower class. Had always been a drudge and in childhood had worked long hours carrying coal and water. Pelvic measurements: Inter spinous, 22 cm.; inter cristus, 26 cm.; left oblique, 21 cm.; right oblique, 21 cm.; external conjugate, 18 cm.; true conjugate, 8 cm. Diagnosis: Simple flat pelvis. Two weeks before expected labor, patient entered Lane Hospital. She was having strong labor pains, and as the head gave indications of engaging in the brim operative interference was not attempted. After twenty-four hours of hard pains she succeeded in delivering herself spontaneously of a six and a half-pound girl baby. The baby was in good condition. The biparietal diameter was 8.5 cm.

Case 4. Relative indication. Mrs. E. N. 1 Para. Age 28. Applied to the San Francisco Maternity April 21, 1907. When seven years old her left hip joint had been excised. Pelvic measurements: Inter spinous, 23.5 cm.; inter cristus, 25 cm.; left oblique, 20 cm.; right oblique, 19.5 cm.; external conjugate, 18.5 cm.; true conjugate, 9 cm. Diagnosis: Generally contracted pelvis. This patient was informed that she could possibly give birth to her child without operation, and she was requested to enter the University of California Hospital. Fearing to attempt labor she applied to a local surgeon and was delivered successfully of a nine-pound girl baby by Cesarian section at the onset of labor pains.

Case 5. Relative indication. Mrs. M. 2 Para. Age 35. Private patient. Some years previously she had been delivered of a live child after thirty-six hours of labor pains. During this delivery three operators had attempted high forceps and had about decided to perforate the head when one attendant

succeeded in dragging the child through the canal. The child lived, but the pelvic organs of the mother were severely damaged. A vagino perineal fistula still persists. During the present pregnancy her attendant had attempted to induce labor at about the thirtieth week. Two weeks later, April 24, 1907, as her physician had left the city for his vacation, the patient applied to me for treatment. The bag of waters had just ruptured. This fact caused me to proceed with the induction of labor, although had I seen the patient earlier I should have recommended Cesarian section at term. Labor was induced by means of Voorhees bags, and a still-born male infant was delivered by a very difficult breech extraction. The child weighed three and a half pounds, the biparietal diameter was 7.5 cm., and along the left parietal and frontal bones was a very deep promontory groove. While under an anaesthetic it was found that the maternal pelvis was contracted latterly to a marked degree and that the promontory, which was high up, projected sharply forward, contracting the true conjugate to approximately 7.5 cm. The external measurements were as follows: Inter spinous, 19.5 cm.; inter cristus, 25.5 cm.; left oblique, 21.5 cm.; right oblique, 24.5 cm.; external conjugate 20½ cm.; between tuberosities, 7.5 cm. Diagnosis: This pelvis was of a masculine, funnel-shaped type. The mother recovered, but still suffers with an incompletely involuted uterus.

It is interesting to note that in this series of nearly seven hundred confinements, aside from the emergency operation of Cesarian section to combat a medical complication, no indication for operation was noted, except pelvic contraction. From careful measurements of the pelvis one patient was found with the absolute indication for Cesarian section, and four patients with the relative indication. Of the three patients coming to Cesarian section the mothers and babies survived. The only patient who attempted the effect of labor pains succeeded in delivering herself, while the only fetal death occurred when premature labor was induced.

**Discussion.**

Dr. Sherman: The subject is an interesting one, not only for those who practice obstetrics, but for all who have to do with the growing pelvis, and in my life I have had to deal with the pelvis of the growing individual. In two of the cases which Dr. Spalding reported he spoke of the tuberculous hips and the resulting deformity of the pelvis. I have excised a great many hips and have been dealing with the subject of tuberculosis for many years. I have not thought of the future of the patient so far as pelvis shape was concerned, but have gone wide of disease and so have interfered with the lines of ossification where the ischium, ilium and pubis meet. This very probably may have interfered with the breadth of the os innominatum. It is an interesting question and I would like to ask, do the children who have hip joint tuberculosis and go on without operation have better pelves than little girls who come to operation and have to have excision of the head of the femur and acetabulum? That question should be thought of by the orthopedist, or whoever has to decide for or against excision. There is another condition which may or may not deform the pelvis. Sociosis is a disease which produces a deformity of the spinal column with collateral deformities of the ribs. I have seen cases where scoliosis had produced not only the deformity of the spinal column, but some distortion of the pelvis. There is the question, then, whether an individual with this distortion of the pelvis could go on and become a mother. Again, I have had to examine young women who had had scoliosis and who afterward wished to marry and the question has come up whether they could marry with the expectation of normal or safe deliveries if they became pregnant. I never have made a pelvic examination of such a person, but I have often thought that I would like to find if a moderate scoliosis was likely to produce a deformity of the pelvis so that the individual could not safely be delivered of a child. I have known of a good many young women whom I have treated as young girls for scoliosis who have married and had children in the normal way.

Dr. Spalding, closing discussion: With regard to what Dr. Sherman has said of hip joint excision, I recall a patient who had her hip excised at the age of two. The x-ray plate, taken when the patient was eighteen, showed the failure of the development of the left side of the pelvis. The deformity was due, I believe, to the operation, and the effect it had on the development of the primary bone centers of the os innominatum, together with the later effect caused by the weight of the body. With regard to the point about scoliosis, I have never met with a patient having a contracted pelvis due primarily to a marked scoliosis. Undoubtedly patients with moderate degrees of scoliosis must go through labor without trouble or we would have noticed this condition more often. I do not think it a point well taken to warn patients against marriage or to frighten them unnecessarily simply because they are treated for scoliosis in childhood, but I think they should be warned that when they do become pregnant they should call their physician's attention to the fact of the condition of the spine. There is too much latitude in warning patients against marriage for all sorts of conditions. I think medical science is sufficiently developed to meet these conditions and particularly well adapted to cope with the deformities of the pelvis.

## FILLING OF BONE CAVITIES.*

By JAMES T. WATKINS, M. D., San Francisco.

It has long been recognized that bone cavities become sooner or later infected, and that they form a menace, not only to primary union, but also to the subsequent healing of the overlying structures. Attempts have been made to fill them with non-absorbable substances, such as amalgam and cement; and with a number of absorbable substances. Among the latter the autoplastic group—blood clot, skin and periosteum and muscle flaps—have been advocated respectively by Schede, Neuber and Schulten. The heteroplastic group, including the fresh young animal bone of McEwen and Poucet, the decalcified bone chips of Senn, and the plaster of Paris compound of Rosenstirn, have each found its warmest advocate in its inventor. No one method has proved universally satisfactory.

The object of the present paper is to direct attention to a new member of the heteroplastic group,

*Read at the Thirty-seventh Annual Meeting of the State Society, Del Monte, April, 1907.